Teldat Router

ARP Proxy

Doc. *DM734-I* Rev. *10.00*
November, 2002

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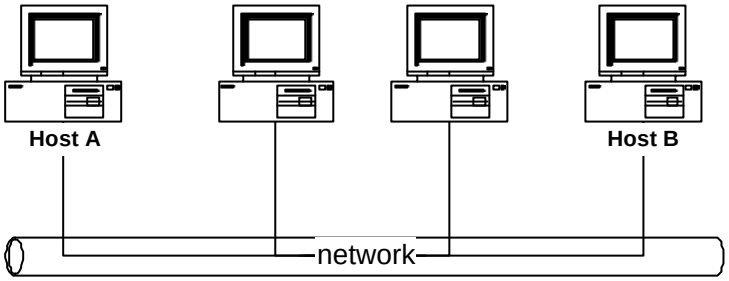
Chapter 1
Introduction

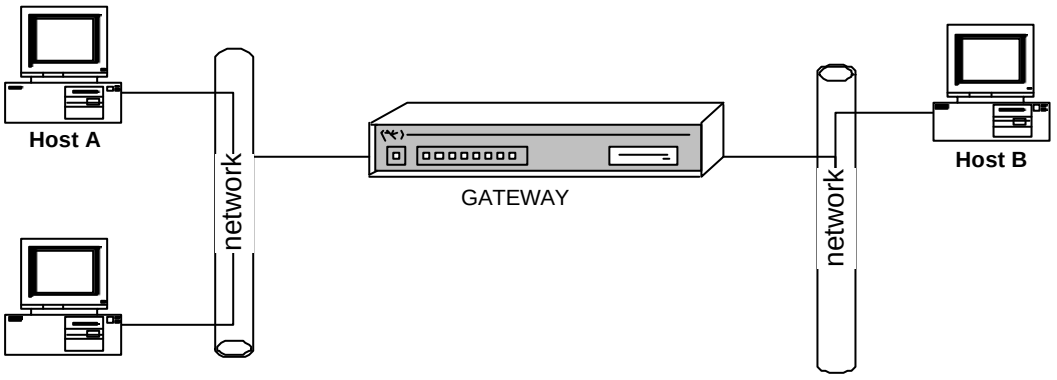
1. ARP Proxy

In a network supporting ARP, when the host A (source) carries out an ARP petition broadcast to discover the network address corresponding to the Host B (destination) IP address, host B acknowledges the IP address appearing in the petition as its own and sends a response with its network address (MAC) to host A. Host A maintains a cache containing the communication IP address – network address and uses it in the subsequent communications. This situation is displayed in Case 1 in the below figure.

CASE 1: Hosts pertaining to the same physical network.



CASE 2: Hosts A and B are located in different physical networks.



However, if the hosts A and B are located in different *physical* networks (Case 2), host B cannot receive the ARP petition broadcast sent by host A and does not respond to the petition. Nonetheless, if the *physical* networks of hosts A and B are interconnected through a **gateway**, the gateway *verifies* the host A ARP petition. Supposing that the IP addresses have been established in such a way that the different subnets correspond with *physical* segments, the gateway can determine that the ARP petition is directed to a host found in a distinct physical segment and therefore respond *in its own name*, telling host A that the host B network address (MAC) is its own (i.e. the gateway's). From this moment onwards, host A sends packets to host B directly to the gateway and the gateway reroutes them to host B through standard IP routing. This mechanism is known as ***"ARP Proxy"***.

The same thing occurs in the opposite direction when host B responds to the traffic originated by host A.

The *physical* networks for hosts A and B do not have to be necessarily connected through the same gateway, all that is required is that they are reachable through the gateway.

In this way, all the subnets ARP handling is carried out in the gateways with ***ARP Proxy*** (from here on, the gateway carrying out this function will be denominated *ARP Proxy*).

From the point of view of the hosts, there are no subnets and their *physical* networks are simply converted into a *global* IP network.

When the *ARP Proxy* detects an ARP petition, it checks that it has a route towards the destination host appearing in the petition; we will assume that the same network mask applies to every subnet of the same IP network. The network mask of the network interface on which the ARP request arrived can then be applied to the target IP address to produce the network part to be looked up in the routing table.

If there is a default route available, the previous check will always succeed as a route is always found for all the addresses.

There are a series of checks needed to ensure the correct functioning of the ARP Proxy:

- You must maintain the same network mask for all the ARP Proxy found in the common IP network. If the source and destination hosts IP networks, which appear in the ARP petitions, are different, the ARP Proxy does not respond.
- The ARP Proxy does not respond either if the source and destination host pertain to the same *physical* network, as it is the destination host itself that responds to the ARP petition.

Chapter 2
Configuration

1. ARP Proxy Configuration

The main steps to be taken for ARP Proxy configuration are described in the following paragraphs.

1.1. Enabling ARP Proxy

In order for the ARP Proxy to carry out its functions, it is essential that the general functions be enabled in the router that is going to execute the ARP Proxy.

1.2. Enabling the ARP Proxy in the interfaces

For each of the interfaces (or IP addresses pertaining to the same interface should it support more than one address) wishing to receive and respond to the ARP petitions, you need to enable the ARP Proxy. This is similar to enabling ARP Proxy in the different network *physical* segments.

1.3. Configuring the Parameters

For each enabled interface, you can configure certain parameters in order to determine the behavior of the system. These are:

a) Checking the subnet mask

The check consists of making sure that the source and destination appearing in the ARP petition belong to the same *global* network (which in its turn is divided into subnets).

b) Using the default route

This consists of using the router's default route. In this way, the ARP Proxy always has a route for any destination host appearing in the ARP petitions. The ARP Proxy then transmits all the packets directed to networks that do not belong to the local *physical* network itself. Except for cases where it is absolutely necessary (due to routing), we do **NOT** recommend using the default route.

WARNING!: The ARP Proxy configuration must be carried out with extreme care as an incorrect configuration in one of the parameters can cause a general malfunction in the IP network should the IP address – MAC address association be incorrectly realized.

2. ARP Proxy configuration commands

This section describes the commands used in the ARP Proxy configuration. The configuration commands must be introduced at the ARP Proxy configuration prompt.

In order to access the ARP Proxy configuration environment, enter the following:

```
*P 4
User Configuration
Config> PROTOCOL IP
Internet protocol user configuration
IP config> PROXY-ARP
Proxy ARP Configuration

Proxy ARP cnfg>
```

The following commands are available within the ARP Proxy configuration environment:

Command	Function
? (HELP)	Lists the available commands or their options.
DISABLE	Globally disables the ARP Proxy or an address (interface).
ENABLE	Globally enables the ARP Proxy or an address (interface).
LIST	Displays the configuration.
SET **P**ARAMETERS	Configures the parameters associated to an address (interface).
EXIT	Exits the ARP Proxy configuration environment.

2.1. ? (HELP)

Lists the available commands or options for a specific command.

Syntax:

```
Proxy ARP cnfg> ?
```

Example:

```
Proxy ARP cnfg> ?
DISABLE
ENABLE
LIST
SET
EXIT
Proxy ARP cnfg>
```

2.2. DISABLE

Disables the ARP Proxy function at distinct levels.

Syntax:

```
Proxy ARP cnfg> DISABLE ?
ADDRESS
GLOBAL
```

a) DISABLE ADDRESS <ip-address>

Disables the ARP Proxy function for the indicated IP address (interface).

Syntax:

```
Proxy ARP cnfg> DISABLE ADDRESS <ip-address>
```

Example:

```
Proxy ARP cnfg> DISABLE ADDRESS
Address (ifc name for unnumbered) [0.0.0.0] 192.14.1.1
Proxy ARP disabled on the address

Proxy ARP cnfg>
```

b) DISABLE GLOBAL

Globally disables the ARP Proxy function.

Syntax:

```
Proxy ARP cnfg> DISABLE GLOBAL
```

Example:

```
Proxy ARP cnfg> DISABLE GLOBAL
Proxy ARP globally disabled

Proxy ARP cnfg>
```

2.3. ENABLE

Enables the ARP Proxy function at distinct levels.

Syntax:

```
Proxy ARP cnfg> ENABLE ?
ADDRESS
GLOBAL
```

a) ENABLE ADDRESS <ip-address>

Enables the ARP Proxy function for the specified IP address (interface).

Syntax:

```
Proxy ARP cnfg> ENABLE ADDRESS <ip-address>
```

Example:

```
Proxy ARP cnfg> ENABLE ADDRESS
Address (ifc name for unnumbered) [0.0.0.0] 212.54.87.6
Proxy ARP enabled on the address

Proxy ARP cnfg>
```

b) ENABLE GLOBAL

Globally enables the ARP Proxy function.

Syntax:

```
Proxy ARP cnfg> ENABLE GLOBAL
```

Example:

```
Proxy ARP cnfg> ENABLE GLOBAL
Proxy ARP globally enabled

Proxy ARP cnfg>
```

2.4. LIST

Displays the ARP Proxy configuration.

Syntax:

```
Proxy ARP cnfg> LIST ?
ADDRESS
ALL
GLOBAL
```

a) LIST ADDRESS

Displays the configuration associated to the enabled addresses intervening in the ARP Proxy function.

Example:

```
Proxy ARP cnfg> LIST ADDRESS
Interface    Address         Proxy ARP Network Check Use Default Route
------------ --------------- --------- ------------- -----------------
ethernet0/0  192.14.1.1      OFF       OFF           OFF
atm0/0       175.26.48.59    ON        ON            ON
Proxy ARP cnfg>
```

The meaning of the fields is as follows:

Interface	Interface identifier that the IP address is associated with.
Address	IP address.
Proxy ARP	Indicates if the ARP Proxy is enabled for this address.
Network Check	Indicates if the network check is enabled or not.
Use Default Route	Indicates if the default route is going to be used or not.

b) LIST ALL

Displays ALL the ARP Proxy configuration information.

Example:

```
Proxy ARP cnfg> LIST ALL

Proxy ARP globally enabled

Interface    Address         Proxy ARP Network Check Use Default Route
------------ --------------- --------- ------------- -----------------
ethernet0/0  197.174.33.75   ON        ON            ON
atm0/0       192.168.252.19  OFF       OFF           OFF
Proxy ARP cnfg>
```

c) LIST GLOBAL

Displays the ARP Proxy global situation, if it is ENABLED or DISABLED.

Example:

```
Proxy ARP cnfg> LIST GLOBAL

Proxy ARP globally enabled

Proxy ARP cnfg>
```

2.5. SET PARAMETERS

Configures the ARP Proxy parameters for a specific IP address.

Syntax:

```
Proxy ARP cnfg> SET PARAMETERS
```

Example:

```
Proxy ARP cnfg> SET PARAMETERS
Address (ifc name for unnumbered) [0.0.0.0]? 198.75.252.27
Check net masks(Yes/No)(N)? y
Use default route(Yes/No)(N)? y
Proxy ARP cnfg>
```

The meaning of the parameters is as follows:

Address	Specifies the address over which the parameters are configured.
Check net masks	Indicates if you wish to activate the network check.
Use default route	Indicates if you wish to use the default route (in this case the router always has a route towards the destination host).

2.6. EXIT

Exits the ARP Proxy configuration environment and returns to the previous configuration prompt.

Syntax:

```
Proxy ARP cnfg> EXIT
```

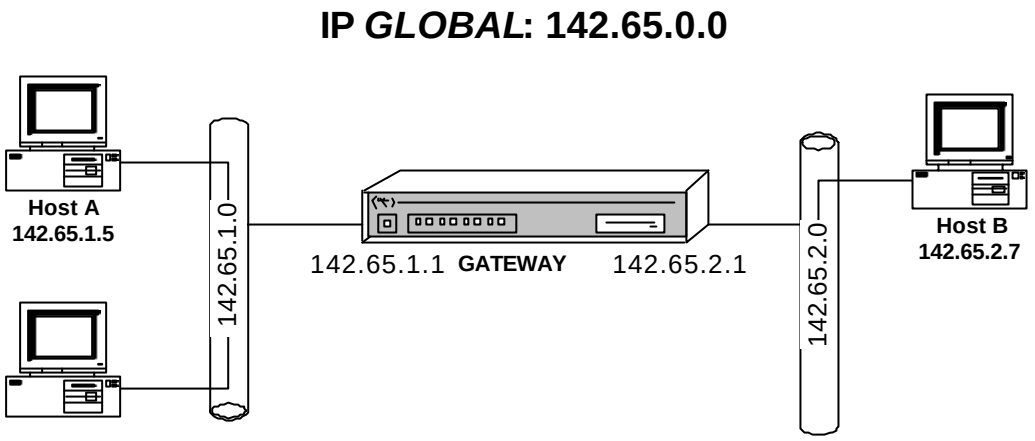
Example:

```
Proxy ARP cnfg> EXIT
IP config>
```

Chapter 3
Example

1. ARP Proxy configuration example

Given the situation shown in the following figure:



The *global* IP network corresponds to the 142.65.0.0 with 255.255.0.0 mask, as a Class B address.

In this case, two physical segments separated within the same global IP network, corresponding to two Class C subnets 142.65.1.0 and 142.65.2.0 are presented.

The hosts are configured with Class B addresses.

If the ARP Proxy is not enabled, the ARP petitions carried out by host A when it wishes to send traffic to host B (and generally to any segment host corresponding to the subnet 142.65.2.0) will not reach its destination (host B) as they cannot communicate despite the fact they pertain to the same *global* IP network.

The steps required to configure the ARP Proxy and to resolve this situation are described below:

1.1. Globally enable the ARP Proxy in the router

Access the ARP Proxy configuration menu and globally enable the ARP Proxy function (subsequently check that the operation has been correctly carried out by listing the ARP Proxy global configuration):

```
Proxy ARP cnfg> ENABLE GLOBAL
Proxy ARP globally enabled

Proxy ARP cnfg> LIST GLOBAL

Proxy ARP globally enabled

Proxy ARP cnfg>
```

1.2. Enabling the ARP Proxy in each router address

The ARP Proxy is enabled in both router addresses (in order to "connect" both physical segments):

```
Proxy ARP cnfg> ENABLE GLOBAL
Proxy ARP globally enabled

Proxy ARP cnfg> ENABLE ADDRESS
Address (ifc name for unnumbered) [0.0.0.0]? 142.65.1.1
Proxy ARP enabled on the address

Proxy ARP cnfg> ENABLE ADDRESS
Address (ifc name for unnumbered) [0.0.0.0]? 142.65.2.1
Proxy ARP enabled on the address

Proxy ARP cnfg> LIST ADDRESS
Interface    Address         Proxy ARP Network Check Use Default Route
------------ --------------- --------- ------------- -----------------
ethernet0/0  142.65.1.1      ON        OFF           OFF
ethernet1/0  142.65.2.1      ON        OFF           OFF
Proxy ARP cnfg>
```

Using the **SHOW MENU** command, the following can be seen:

```
Proxy ARP cnfg> SHOW MENU
; Showing Menu Configuration

      enable address 142.65.1.1
      enable address 142.65.2.1
      enable global
Proxy ARP cnfg>
```

As we are connecting two segments pertaining to the same IP global network and the segments are directly accessible through the gateway executing ARP Proxy, you do not need to modify any additional parameters.

If "supernetting" is carried out in the hosts (this is configuring network masks that are less restrictive than the class the network corresponds to) you must disable the network check. E.g. if the hosts in the previous example are configured with the Class C IP address 200.x.x.x and the Class B mask 255.255.0.0, the network check provoking the ARP petitions from the 200.65.1.0 towards the 200.65.2.0 will not be responded to by the ARP Proxy (as they are different networks).

The final step is to save the configuration and to restart the router.